

10/18/17

"The biggest human temptation is to settle for too little" -Thomas Merton

HW: "Solving Radical Equations HW" #2-20 even
Test 3 on Monday 10/30

AIM: How do we solve Radical Equations?

Warm Up:

1) Factor **completely**: $4x^3 + 28x^2 - 9x - 63$

$$\begin{array}{r|l} 4x^2(x+7) & -9(x+7) \\ \hline & \end{array}$$

$$(x+7)(4x^2-9)$$

$$(x+7)(2x+3)(2x-3)$$

$$\otimes y \cdot + 3 \otimes$$

← DOTS
(Diff
of
Two
Squares)

2) Simplify: $\frac{4x^6y^8 - 3x^8}{12x^3}$

An equation that contains at least one radical term with a variable in the radicand is called a **radical equation**. For example, $\sqrt{2x - 3} = 5$ is a radical equation. Since the radical is a square root, we can solve this equation by squaring both sides of the equation.

Solution:

$$\begin{aligned}\sqrt{2x - 3} &= 5 \\ (\sqrt{2x - 3})^2 &= 5^2 \\ \underline{2x - 3} &= 25 \\ 2x &= 28 \\ x &= 14\end{aligned}$$

Check:

$$\begin{aligned}\sqrt{2x - 3} &= 5 \\ \sqrt{2(14) - 3} &\stackrel{?}{=} 5 \\ \sqrt{28 - 3} &\stackrel{?}{=} 5 \\ \sqrt{25} &\stackrel{?}{=} 5 \\ 5 &= 5 \checkmark\end{aligned}$$

Alt:

$$(2x - 3)^{\frac{1}{2} \cdot \frac{2}{1}} = 5^{\frac{2}{1}}$$

$$2x - 3 = 25$$

Practice:

1) $\sqrt{x+6} = x$

$$(x+6)^{\frac{2}{2}} = x^2$$

$$\begin{array}{r} x+6 = x^2 \\ -x-6 \quad -x-6 \\ \hline 0 = x^2 - x - 6 \end{array}$$

$$x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$\begin{array}{l|l} x-3=0 & x+2=0 \\ \hline x=3 & x=-2 \end{array}$$

check

$$\sqrt{3+6} = 3$$

$$\sqrt{9} = 3$$

$$3 = 3$$

check

$$\sqrt{-2+6} = -2$$

$$\sqrt{4} = -2$$

$$2 = -2$$

X

2) $\sqrt{x+1} + 5 = 0$

$$\begin{array}{r} \sqrt{x+1} + 5 = 0 \\ -5 \quad -5 \\ \hline \sqrt{x+1} = -5 \end{array}$$

$$x+1 = 25$$

$$\begin{array}{r} x+1 = 25 \\ -1 \quad -1 \\ \hline x = 24 \end{array}$$

reject
doesn't
work

$$x = \emptyset$$

$$x = \{ \}$$

No Solution

3) $\sqrt{2-x} = x$

$$(2-x)^{\frac{2}{2}} = x^2$$

$$\begin{array}{r} 2-x = x^2 \\ -2+x \quad -2+x \\ \hline 0 = x^2 + x - 2 \end{array}$$

$$0 = x^2 + x - 2$$

$$(x+2)(x-1)$$

$$\begin{array}{l|l} x+2 & x-1 \\ \hline x=-2 & x=1 \end{array}$$

$$x = 1$$

4) $\frac{x}{2} = 2\sqrt{2x-3}$

$$\left(\frac{x}{2}\right)^2 = (2\sqrt{2x-3})^2$$

$$\cancel{4} \left(\frac{x}{\cancel{4}}\right)^2 = (2\sqrt{2x-3})^2$$

get rid of
denominator

$$\begin{array}{r} x^2 = 8x - 12 \\ -8x + 12 \quad -8x + 12 \\ \hline x^2 - 8x + 12 = 0 \end{array}$$

$$(x-6)(x-2)$$

$$\begin{array}{l|l} x-6 & x-2 \\ \hline x=6 & x=2 \end{array}$$

$$5) \sqrt{2x-4} = x-2$$

$$6) \sqrt{x+1} = x-1$$

$$7) \sqrt{x+6} + x = 6$$

$$8) \sqrt{x+3} = 3-x$$